Salticus, Latreille, 1804, Nouv. Dict. xxiv. p. 135, col. 2, line 51.

Latreille included under this name two groups:—A. "Les Chercheuses," Walk. Faun. Par. p. 248 (1802); and B. "Les Sauteuses," id. p. 243; quoting the following species: (1) *Aranea cinnaberina*, Oliv.—*4-guttata*, Rossi; (2) *Aranea scenica*, Linn.; (3) *Aranea formicaria*, De Geer.

This genus, which included also a number of other species —*A. tardigrada, pomatia, chalybeia, psylla, cuprea, coronata, virgulata, pubescens, nidicolens, fontalis, lunulata, bicolor, callida, nigra, tripunctata, litterata*, and *muscorum*—under "Les Sauteuses," was first split up by Walckenaer in the following year 1805 in the 'Tableau,' pp. 21 & 22. He withdrew first *A. cinnaberina* under *Eresus* (p. 21), and next (p. 22) under *Attus* all the other species named, leaving nothing under *Salticus*, and ignoring it altogether.

No further subdivision or selection in connexion with these two last-named genera took place until 1810, when Latreille definitely selected *A. scenica*, Fabr., as the type of *Salticus*, Consid. gén. Nat. Ord. Crust., Arach. et Ins. p. 423.

Thorell has evidently overlooked this selection of types by Latreille in 1810; and most authors have followed Sundevall, who, in 1832, selects under *Salticus*, typus, *S. formicarius*, De Geer, a selection which of course cannot stand.

Type, *Salticus scenicus* (Clerck), 1757, = *A. scenica*, Fabr. & Linn.

X.—*On the Anatomy of certain Agnathous Pulmonate Mollusks.* By Walter E. Collinge, F.Z.S., Lecturer on Zoology and Comparative Anatomy in the University of Birmingham.

[Plates I. & II.]

Towards the end of 1899 Mr. Henry Suter sent me a series of examples of various New Zealand land-mollusks preserved in alcohol, and expressed a wish that I would give some account of their internal anatomy. I take this opportunity of expressing to him my best thanks for his kindness. About the same time Mr. William Moss, of Ashton-under-Lyne, sent me specimens of *Schizoglossa novoseelandica*, Pfr.; to him also my best thanks are here tendered. Finally, my best thanks are due to the Council of the Birmingham Natural

History and Philosophical Society for defraying the cost of the drawings illustrating this paper.

The anatomy of the Agnathous Pulmonates has received but little attention ; hence anything like a classification based on anatomical characters is at present quite impossible. Woodward * has given an interesting account of *Natalina caffra*, Fér., and other contributions to the anatomy of this genus have been made by Pilsbry † and Pace ‡. Godwin-Austen § has given an account of the anatomy of *Paryphanta Hochstetteri*, Pfr. ; but I am unable to confirm many of his statements. Other references to the anatomy of the Australian and New Zealand species are to be found in the various papers of Hedley and Suter.

Rhytida, Albers.

Rhytida Greenwoodi, Gray. (Pl. I. figs. 1–16.)

Animal yellowish brown, darker on the dorsum anteriorly ; a deep groove characterizes the median dorsal line beyond the visceral mass. Mantle yellow, with irregular black markings ; collar shows slight indications of division into right and left mantle-lobes. Eyes situated some little distance backward from the end of the upper tentacle. Male generative orifice 10 millim., female generative orifice 11 millim. from the right upper tentacle. Rugæ on the head almost square, on the sides of the body anteriorly round, in parallel lines in both cases ; posteriorly very small and irregular. Sulci faint sepia-colour or white. Peripodial groove ill-defined. Foot-fringe whitish, with very minute sepia-coloured spots. Lineoles absent. Foot-sole not distinctly divided into median and lateral planes, laterally sepia-coloured, dirty white in the median portion.

Length (in alcohol) 38 millim.

Hab. Levin, Manawater, New Zealand.

This species, the type of the genus, was described by Gray in 1849 ‖. All the descriptions yet given, such, for example, as those by Reeve ¶, Pfeiffer **, Hector ††, Hutton ‡‡, and

* Proc. Malac. Soc. Lond. 1895, vol. i. pp. 270–277, pl. xvii.

† Proc. Acad. Nat. Sci. Philad. 1889, pp. 277–279, and 1890, pp. 241–243.

‡ Proc. Malac. Soc. Lond. 1895, vol. i. pp. 232–233.

§ *Op. cit.* 1893, vol. i. pp. 5–9, pl. i.

‖ Proc. Zool. Soc. 1849, p. 165.

¶ Conch. Icon. vol. vii. sp. 434, pl. lxxxi. fig. 434.

** Mon. Hel. viv. vol. iii. p. 156.

†† Catal. Land Moll. N. Zeal. 1873, p. 18.

‡‡ Man. N. Zeal. Moll. 1880, p. 16.

Tryon *, relate to the shell of the animal only, no description having yet been given of the animal. A figure of the radula has been published †, and Suter ‡ has given a figure of the animal with the shell attached, but the drawing leaves much to be desired.

Anatomy.

The Alimentary Canal. — The buccal mass is large, measuring 18·5 millim. in length in the alcoholic specimens examined. The muscular attachments, as in the allied genus *Paryphanta*, are very strong. The buccal retractors are inserted posteriorly and ventro-laterally, laterally there are a series of muscles which have their origin on the floor of the body-cavity (Pl. I. fig. 10, *r.m.*). Posteriorly the buccal mass has the appearance of having a muscular cap (Pl. I. figs. 10, 11), but on dissection this is found to be due to the upward curving of the terminal portions of the muscular sheath of the radula. The radula is curved downwards in the extreme anterior region and laterally embraces the muscular sheath; looked at from the opening of the mouth it has the appearance shown in figure 7 (Pl. I.).

The *œsophagus* enters the dorsal surface of the buccal cavity about 4·5 millim. from the anterior end; it is a thin narrow tube, enlarging to a wider cavity behind the salivary glands §. These latter are two large glands situated on the posterior portion of the buccal mass (Pl. I. fig. 10, *s.gl.*); they are fused together in the median line. From the anterior end of each a long fine salivary duct is given off, and these enter the buccal cavity slightly below and behind the opening of the œsophagus (Pl. I. fig. 10).

The Pedal Gland (Pl. I. figs. 12, 13).—Lying on the floor of the body-cavity is a small flattened structure—the pedal gland. The actual gland measured 13 millim. in length; at its posterior end it makes a bend to the right side and then again towards the left, thus being formed by what may be described as three limbs; the third limb is partly covered by a series of strands of pedal muscles. The retractor muscle is attached ventrally and arises from the floor on the right side. Attached to the underside of the third limb and lying deeply

* Man. Conch. 1885 (ser. 2) vol. i. p. 126, pl. xxiv. fig. 74.

† Trans. N. Zeal. Inst. vol. xvi. p. 167, pl. x. fig. P.

‡ Journ. of Malac. 1899, vol. vii. pl. iii. fig. 1.

§ Owing to part of the animal having been left in the shell, which I did not receive, I have been unable to describe the remainder of the digestive system.

in the pedal muscles is a spongy mass about 4 millim. in length (Pl. I. fig. 12).

The Generative Organs (Pl. I. figs. 8, 9, and 14–16).—As already pointed out, the generative orifices are really distinct and lie about 1 millim. apart and 11 millim. from the right upper tentacle (Pl. I. figs. 1, 8, and 9). The female orifice is surrounded by a prominent white lip, the dorsal and anterior portion of which is produced as a thin fold forward, and forms the dorsal boundary of the male generative orifice (Pl. I. figs. 8, 9). This latter leads into a long narrow tube—the penis. At its commencement the inner walls are plicated; passing backward there is a thickened muscular ridge on the ventral side, which is covered with a series of fleshy tooth-like projections (Pl. I. fig. 16). On careful dissection the penis is found to be folded upon itself, the distal limb scarcely being distinguishable until separated by dissection. Passing forward almost as far as the external orifice, it again makes a bend and becomes slightly larger, almost sac-like, the internal wall again showing plications in this region. From the distal end of this sac-like portion the vas deferens arises as a fine densely convoluted tube (Pl. I. fig. 14, *v.d.*) which joins the prostatic portion of the common duct. There is a short retractor muscle attached to the end of the first bend of the penis (Pl. I. fig. 14, *r.m.*). The female generative orifice leads into a short wide cavity—the vagina,—into the upper portion of which the receptaculum seminis and free oviduct open. The receptaculum seminis is sessile, consisting of a long tube-like diverticulum; at its distal end a small retractor muscle is inserted. Internally the wall is thrown into a series of wavy folds. The free oviduct is short. Internally its walls show a series of projections which branch and anastomose (Pl. I. fig. 15). The common duct is folded from right to left and showed no variation from that figured in any of the three dissections. There is a large albumen gland. The hermaphrodite gland had been broken away in the missing portions of the liver &c.; the duct, however, remained as a fine and densely convoluted tube (Pl. I. fig. 14, *h.d.*).

Paryphanta, Albers.

Paryphanta Hochstetteri, Pfr. (Pl. II. figs. 17–21.)

The anatomy of this species was described by Lieut.-Col. Godwin-Austen in 1893. I dissected three of the specimens sent to me by Mr. Suter, but found considerable differences in the male generative organs from those described and figured

by Godwin-Austen, in consequence of which I decided to obtain further material and carefully work through the system again. Owing to this the publication of the present paper has been somewhat delayed. The later dissections fail to verify the above-mentioned account, and I must take exception to the comparisons and conclusions the author has drawn at the close of his paper.

On unravelling the terminal ducts of the generative organs the penis with its darkly pigmented proximal portion is very conspicuous. In life it lies across the buccal mass, the right tentacular retractor muscle crossing over it at the proximal end (Pl. II. fig. 17). In the last specimen dissected it measured 37 millim. in length. It is a large muscular organ, consisting for the greater part of its length of a simple tube, the terminal portion only, to which the retractor muscle is attached, being solid. I failed to find any knob-like process or nipple-like crenulations, as figured by Godwin-Austen (*op. cit.* pl. i. fig. 12), although the lumen of the tube was carefully traced for 32 millim. The vas deferens is a long fine tube closely bound to the sides of the penis for the greater portion of its length. Godwin-Austen states (*op. cit.* p. 7) that "the vas deferens is short and unites with it [the penis] very low down, not far from the generative aperture." As shown in figure 18 (Pl. II.) the vas deferens leaves the penis towards its distal end, and is closely bound to its wall by strands of connective tissue; towards the proximal end of the penis it folds itself around that organ, and then passing down to the region of the vagina, it runs along its left dorsal side as a convoluted tube; at the point where the receptacular duct enters the vagina the vas deferens dips beneath the free oviduct, reappearing on the right side, still exhibiting convolutions; it then passes across to the left side, where it becomes continuous with the prostatic portion of the common duct. In order to verify what I had made out by dissection, the penis of a further specimen was taken and sections cut by the freezing microtome; these fully bore out the conclusions drawn from the dissections (*cf.* Pl. II. fig. 19, $\times^1$–$\times^5$).

On the supposition that the vas deferens in this species was very short &c., Godwin-Austen proposed to place the genera *Paryphanta*, *Ælea*, and *Schizoglossa* in a new subfamily—Paryphantinæ: "*Schizoglossa* bearing the same relationship to *Paryphanta* as *Girasia*, Gray, does to *Macrochlamys* among the Zonitidæ."

The Pedal Gland (Pl. II. figs. 20, 21).—The position occupied is similar to that in *Rhytida Greenwoodi*. The gland measured 17·5 millim. in length; at its posterior end it

makes a bend to the left side and then dips down into a cavity bounded by the pedal muscles. To this portion the short retractor muscle is attached on the right side (Pl. II. fig. 21).

Paryphanta Edwardi, Suter. (Pl. II. figs. 22–25.)

Animal a deep blue, darker laterally than on the dorsum. Mantle greyish white, with very fine sepia markings on the collar, which is divided as in the genus *Rhytida*. Generative orifice 8·5 millim. from the right upper tentacle. Rugæ irregular, very small posteriorly. Sulci bluish white. Peripodial groove ill-defined. Foot-fringe bluish white and finely spotted, no lineoles. Foot-sole sepia-coloured, with a tinge of blue in the median portion, not divided into median and lateral planes.

Length (in alcohol) 43 millim.

The shell and radula of this species were described by Suter in 1899 *. It differs considerably from the preceding species. Suter regards it as standing nearest to *P. atramentaria*, Shuttl., from Victoria, a species I am unacquainted with.

Anatomy.

The Alimentary Canal.—The buccal cavity calls for no special mention. The œsophagus enters on the dorsal surface; tracing this posteriorly it widens a little, forming the crop, around which the salivary glands are closely wrapped; the ducts leave the anterior borders and enter the buccal mass at the side of and just behind the œsophagus. Behind the crop there is a thin tube-like portion of the canal, which again widens before reaching the stomach.

The Pedal Gland (Pl. II. figs. 23, 24) is very similar to that in *P. Hochstetteri*, Pfr., differing, however, in its greater length, measuring *in situ* 24 millim., and in turning forwards and downwards to the left side. Imbedded in the pedal muscles and quite distinct from this gland is a small glandular body like that found in *Rhytida Greenwoodi*, Gray.

The Generative Organs (Pl. II. fig. 25).—On turning back the body-wall the penis is seen to lie in a very similar position to that in *P. Hochstetteri*. It measured 58 millim. in length. It is an almost straight tube, widening in the distal half. In structure it is similar to that in the preceding species. Being larger the vas deferens is easily made out from the left side of the distal end of the penis to the union with the prostatic canal. It is a simple tube not convoluted.

* Proc. Malac. Soc. Lond. 1899, vol. iii. p. 290, pl. xv. figs. 14, 15.

The vagina is considerably larger than in *P. Hochstetteri*; at its extreme distal end a short sessile receptaculum seminis is seen. The free oviduct is very short and arises latero-dorsally on the right side, passing in an oblique direction forwards. The common duct is a long, almost straight, double tube. The remaining organs call for no special mention.

Until more species of this genus have been anatomically examined any comparisons are of little value. *P. Edwardi* is very distinct from *P. Hochstetteri* so far as the generative organs are concerned, though it is very probable that there exist intermediate species which would connect the two.

Schizoglossa, Hedley.

Schizoglossa novoseelandica (Pfr.), em. Hedley. (Pl. II. figs. 26–30.)

Daudebardia novoseelandica, Pfr. Mal. Blatt. 1861 (1862), vii. p. 146; Hutton, Man. N. Zeal. Moll. 1880, p. 12; Pfeiffer, Mon. Hel. viv. v. p. 10.

Daudebardia neozelanicus, v. Mart.

Daudebardia? novoseelandica, Kobelt, Jahrb. d. D. mall. Gesell. 1879, vii. p. 26; Fischer, Man. de Conch. 1887, p. 256.

Schizoglossa novoseelandica, Hedley, Proc. Linn. Soc. N. S. W. 1893 (ser. 2), vii. p. 389, pl. ix. figs. 1, 2.

Animal (in alcohol) brownish yellow, darker on the dorsum, posteriorly and latero-posteriorly splashed with irregular black markings. Dorsum marked by two parallel lines running from the anterior edge of the mantle to the head, and well-marked lateral grooves running from the mantle to the lips. Posterior to the mantle the visceral mass slightly overhangs the tail-region. No caudal mucous pore. Respiratory orifice in the antero-lateral margin of the mantle. Rugæ large, ill-defined laterally. Sulci almost black. Peripodial groove indistinct. Foot-fringe yellow, with greyish-yellow lineoles. Foot-sole greyish yellow, with faint transverse wrinkles, not divided into median and lateral planes.

Length (in alcohol) 25 millim., foot-sole 8 millim. broad.

Hab. Near Stratford, North Island, New Zealand.

The genus *Schizoglossa* was constituted by Hedley in 1893 * for the reception of the *Daudebardia novoseelandica* of Pfeiffer †. The species was originally described from the shell only. Hedley (*op. cit*) was the first to give a description of the animal and its structure and to figure the same and shell; he therefore must be regarded as the authority for this species.

* Proc. Linn. Soc. N. S. W. 1893 (ser. 2), vol. vii. p. 389.

† Mal. Blatt. 1861 (1862), Bd. vii. p. 146.

The specimens upon which I have worked were sent by Mr. R. Murdoch to Mr. W. Moss, and were collected near Stratford, North Island, New Zealand.

Although Hedley's account was a valuable contribution at the time to our knowledge of this species, it left much to be desired as regards the figures and the minute detail of the anatomy. I have endeavoured in the present paper to give more careful drawings of the animal, and am able to supplement in a few points his account of the internal structure. Unfortunately in all the specimens the pallial complex had been damaged in removing the shells before they came into my possession, so that I am unable to give any description of this interesting region. A detailed account of the anatomy from fresh specimens is much to be desired.

Anatomy.

The *alimentary canal* is very short. The buccal mass measured 12 millim. in length (Pl. II. fig. 28). The œsophagus enters the dorsal surface 5 millim. from the anterior end; it is a short wide tube, and leads directly into the crop, the internal walls of which are plicated. The salivary ducts enter a little behind and lateral to the œsophageal opening.

The *pedal gland* (Pl. II. fig. 29) has the usual position; it is considerably smaller than in either the genus *Rhytida* or *Paryphanta*.

The Generative Organs (Pl. II. fig. 30).—The vestibule is a spacious chamber leading directly into the vagina; on the left side the penis opens. This organ is a short tube and exhibits little difference from the vas deferens, except that it is slightly wider. In none of the specimens dissected had it the form figured by Hedley (Proc. Linn. Soc. N. S. W. 1893, vii. pl. x. fig. 9). All the portion from just above the retractor muscle to the entrance into the vestibule is covered by a mass of connective tissue, and when this is dissected away the appearance is as figured (Pl. II. fig. 30, *p.*). The retractor muscle is small and short; it arises from the body-wall immediately below the penis. The vas deferens is a short tube not sharply marked off from the penis. Where the common duct commences the oviducal portion internally has richly folded walls, and the prostatic canal can be easily traced the whole of its length. I failed to find any trace of a receptaculum seminis. There is a large albumen gland and a small hermaphrodite gland, the duct of the latter being comparatively short and slightly convoluted.

EXPLANATION OF PLATES I. & II.

Rhytida Greenwoodi, Gray.

Fig. 1. View of the animal from the left side, × 1½.
Fig. 2. View of the posterior portion of the dorsum from above, × 1½.
Fig. 3. Latero-ventral portion of the head, × 4.
Fig. 4. Lateral view of the head, with buccal cavity partly extended, × 2.
Fig. 5. The same, seen from the ventral side, × 2.
Fig. 6. Anterior view of the mouth, × 3.
Fig. 7. Diagrammatic figure of the radula as seen from the anterior end.
Figs. 8, 9. Male and female generative orifices.
Fig. 10. Lateral view of the buccal mass, × 2.
Fig. 11. Dorsal view of posterior end of same.
Fig. 12. The pedal gland, × 3.
Fig. 13. Posterior portion of the same seen from below.
Fig. 14. The generative organs.
Fig. 15. Internal wall of the free oviduct, × 2.
Fig. 16. Penis dissected, to show the fleshy tooth-like projections, × 2.

Paryphanta Hochstetteri, Pfr.

Fig. 17. Diagram to show relation of the penis to the buccal mass and right tentacular retractor muscle.
Fig. 18. The generative organs.
Fig. 19. Transverse sections of the penis. The position of each section is indicated in the preceding figure by the lettering $\times^1$–$\times^5$.
Fig. 20. The pedal gland, × 2.
Fig. 21. Lateral view of posterior portion of same, × 2.

Paryphanta Edwardi, Suter.

Fig. 22. View of the animal from the left side, × 1½.
Fig. 23. The pedal gland, × 2.
Fig. 24. Lateral view of posterior portion of same, × 2.
Fig. 25. The generative organs.

Schizoglossa novoseelandica (Pfr.), em. Hedley.

Fig. 26. View of the animal from the left side, × 2.
Fig. 27. Dorsal view of the same, × 2.
Fig. 28. Lateral view of the buccal mass &c., × 3.
Fig. 29. The pedal gland, × 2.
Fig. 30. The generative organs, × 3.

In figures 1, 22, 26, and 27 the animals are represented without the shell.

Reference letters.

alb.gl. Albumen gland.
b.c. Buccal cavity.
b.r.m. Buccal retractor muscle.
f.ov. Free oviduct.
h.d. Hermaphrodite duct.
h.gl. Hermaphrodite gland.
œ. Œsophagus.
ov. Oviduct.
p. Penis.
pr. Prostate.
r.m. Retractor muscle.
r.d. Receptacular duct.
r.s. Receptaculum seminis.
r.t.r. Right tentacular retractor.
s.d. Salivary duct.
s.gl. Salivary gland.
v. Vestibule.
v.d. Vas deferens.
vg. Vagina.